VOLVO SERVICE

PART 7

FRAME
SUSPENSION
WHEELS

C 3-series

SERVICE MANUAL

CONTENTS

Part 7

GROUP 70 GENERAL

Data

FRAME

Type	Fully welded with box-section side members
Length, 2-axle vehicle, wheelbase 2300 mm (90.5")	2530 mm (100")
, 2-axle vehicle, wheelbase 2530 mm (100")	3990 mm (157")
, 3-axle vehicle, wheelbase 2720 + 1050 mm (107 + 41")	5674 mm (223")

Front springs

2-axle vehicle, wheelbase 2300 mm (90.5")

Type	Leaf springs
Length between anchorage centres	1300 mm (51")
Width	76 mm (3")
Number of leaves	7
Thickness of leaves:	
Leaves 1–7	7 mm (0.28")
Test values (complete spring)	
Load with deflection of 1 cm (0.4")	560 N (56 kp = 123 lb.)
Load for straight spring (spring must first be loaded to negative deflection of 150 mm = 6")	5900 N (590 kp = 1300 lb.)

2-axle vehicle, wheelbase 2530 mm (100")

Type	Leaf springs
Length between anchorage centres	1300 mm (51")
Width	76 mm (3")
Number of leaves	8
Thickness of leaves:	
Leaves 1–8	7 mm (0.28")
Test values (complete spring)	
Load with deflection of 1 cm (0.4")	640 N (64 kp = 140 lb.)
Load for straight spring (spring must first be loaded to negative deflection of 150 mm = 6")	7000 N (700 kp = 1400 lb.)

3-axle vehicle

Type	Leaf springs
Length between anchorage centres	1300 mm (51")
Width	76 mm (3")
Number of leaves	8
Thickness of leaves:	
Leaves 1–8	7 mm (0.28")
Test values (complete spring)	
Load with deflection of 1 cm (0.4")	640 N (64 kp = 140 lb.)
Load for straight spring (spring must first be loaded to negative deflection of 150 mm = 6")	7000 N (700 kp = 1400 lb.)

Rear springs

2-axle vehicle, wheelbase 2300 mm (90.5")

Type	Leaf springs
Length between anchorage centres	1300 mm (51")
Width	76 mm (3")
Number of leaves	8

Thickness of leaves:		
Leaves 1–8	7 mm	(0.28")
Test values (complete spring)		
Load with deflection of 1 cm (0.4")	640 N	(64 kp = 140 lb.)
Load for straight spring must first be loaded to negative deflection of 150 mm = 6 ")	7000 N	(700 kp = 1400 lb.)

2-axle vehicle, wheelbase 2530 mm (100")

Type	Leaf springs	
Length between anchorage centres	1300 mm	(51")
Number of leaves	9	
Thickness of leaves:		
Leaves 1–9	7 mm	(0.28")
Test values (complete spring)		
Load with deflection of 1 cm (0.4")	720 N	(72 kp = 160 lb.)
Load for straight spring (spring must first be loaded to negative deflection of 150 mm = 6")	8300 N	(830 kp = 1825 lb.)

3-axle vehicle

Type	Leaf springs of parallel type	
Length	1320 mm	(51")
Width	76 mm	(3")
Number of leaves	4	
Thickness of leaves in centre:		
Leaves 1–4	13 mm	(0.5")
Test values (complete spring)		
Load with deflection of 1 cm (0.4")	1040 N	(104 kp = 230 lb.)
Load for straight spring	19900 N	(1990 kp = 4380 lb.)

Helper spring

Type	Hollow-rubber

Shock absorbers

Type	Telescopic	
Length between anchorage centres:		
Compressed	404 mm	(16")
Extended	671 mm	(26")

Wheels

Rims

Type	Disc	
Size	7.5 L x 16"	
Number of wheel nuts	8	
Max. radial throw	2 mm	(0.08")
Max. lateral throw	2 mm	(0.08")
Circle diameter of wheel studs	222 mm	(8.75")

Tyres

Size	280/85 x 16" 4-ply special	
Wheel revs per km (mile)	approx. 375	
Tyre pressure, front	1.6 kp/cm^2	(23 lbf/in^2)
, rear	1.75 kp/cm^2	(25 lbf/in^2)

Hubs (front and rear)

Pre-load, new wheel bearings	42–48 N (4.2–4.8 kp = 9–10 lbftf) + friction of sealing rings
, run-in wheel bearings	24–28 N (2.4–2.8 kp = 5–6 lbftf) + friction of sealing rings
Bearing clearance when about to adjust	0.08 mm (0.0032")

Bogie

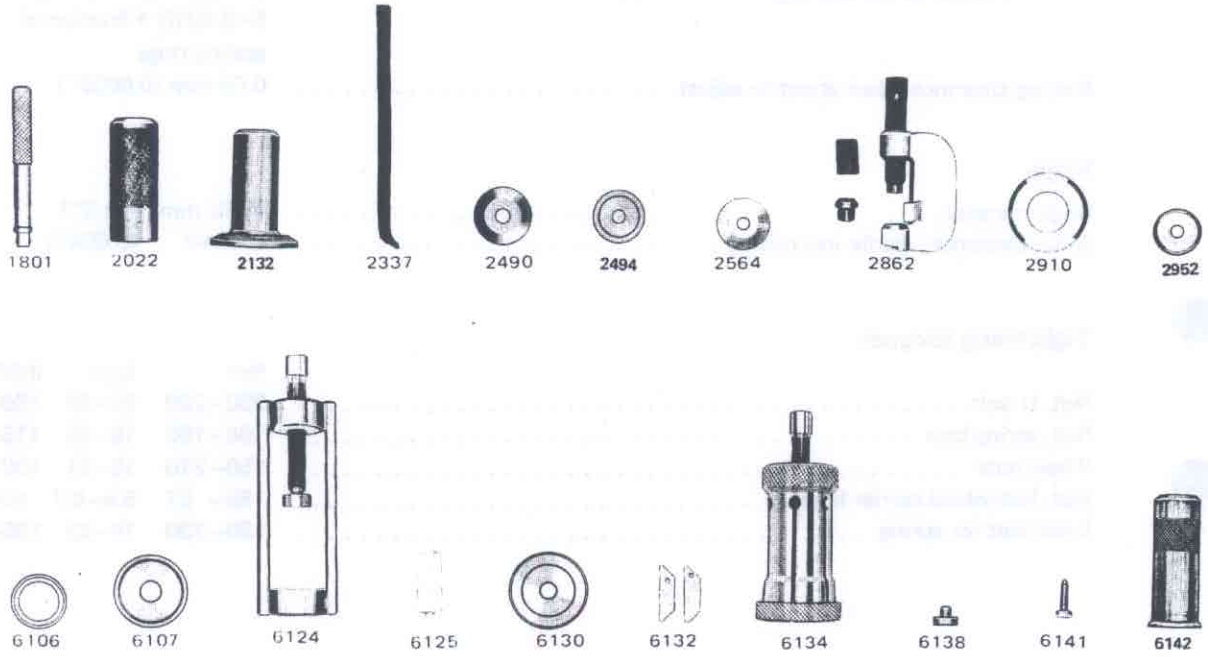
Bogie distance	1050 mm (41.3")
Axial clearance, cradle journalling	0.1 mm (0.004")

Tightening torques

	Nm	kpm	lbftf
Nut, U-bolt	230–280	23–28	166–202
Nut, spring bolt	160–190	16–19	115–137
Wheel nuts	150–210	15–21	108–152
Nut, hub-wheel carrier housing	55– 67	5.5–6.7	40– 48
Lock bolt for spring	180–230	18–23	130–166

Tools

The following special tools are required for work on the frame, suspension, wheels



1801 Standard handle
2022 Sleeve for pressing on gear wheel
2132 Sleeve for pressing sealing ring into cradle
2337 Drift
2490 Drift for removing outer bearing outer ring in hub
2494 Drift for pressing needle bearing into cradle
2564 Drift for removing inner bearing outer ring in hub
2862 Press tool for removing and installing wheel studs
2910 Sleeve for installing outer sealing ring in hub
2952 Drift for pressing needle bearing out of cradle
6106 Sleeve for installing inner and outer bearing inner ring in hub
6107 Drift for installing inner bearing outer ring in hub
6124 Press tool for removing and installing spring bushings
6125 Drift. Used together with 6124 when removing spring bushing and for removing and installing rubber bushings on reaction rods
6130 Drift for installing inner seals in hub
6132 Press washers for removing outer bearing outer ring in hub
6134 Puller for removing outer bearing inner ring in hub
6138 Guide. Used together with 6124 and 6125
6141 Bolt for pressing out hub
6142 Sleeve for installing bearing races

GROUP 71 FRAME

Description

The frame is made up of two box-profile side members which are joined together by means of four crossmembers. The front and rear crossmembers are of box-section while the two intermediate are gas-tight tubular members which function as vacuum tanks.

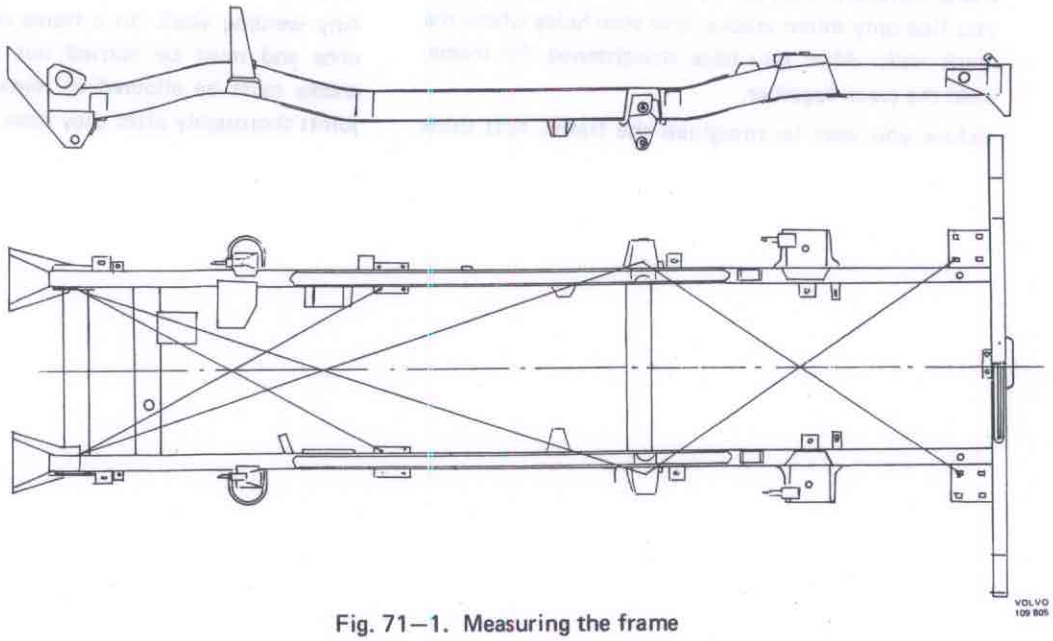


Fig. 71–1. Measuring the frame

Service Procedures

Measuring the frame

If it is suspected that for some reason or other the frame is faulty, it should be check-measured. This can be done by transferring the position for certain fixed points to a flat, clean floor. Measuring is then done on the floor. The points shown in Fig. 71–1, for example, can be used.

Suspend a pointed plumb over one of the points. The vehicle must be securely parked with the parking brake or blocks behind the wheels. At the point on the floor over which the plumb hangs mark clearly with chalk. Then with a pencil or scriber make a cross on this mark, immediately below the plumb pointer. Repeat this procedure at the other points. Then remove the vehcile. Talc a piece of string and stretch this between two of the points. Pull upp the middle of the string slightly and let it strike against the floor. This will cause the talced string to make a white line between the points. Do the same between the other points so that you get diagonal lines as shown on Fig. 71–1. When measuring between the points marked where the plumb was suspended, the length of two diagonals crossing each other should agree with a permitted deviation of max. 3 mm (1/8"). If the deviation exceeds this, then the frame is crooked and must be straightened.

To find out whether the frame is twisted or bent, place it on trestles with the side members straight upper edges parallel with the floor and both sides at the same height. Measure the distance from the floor to the straight upper edge on the frame. This measurement is then to be used as a basic measurement when check-measuring. If this measuring is to be reliable, the floor must be absolutely flat. Be particularly thorough when marking and measuring. A faultless frame should be flat and the side members straight and in parallel.

Straightening and repairing the frame

The frame should preferably be straightened when in a cold condition. If it must be heated, do not go too far with this. Under no circumstances may the frame be heated to more than a cherry colour, that is, a dark red heat.

Before you start to straighten the frame, examine it for cracks, etc. If you find major cracks in any of the frame members, then the frame should be replaced. If you find only minor cracks, drill stop holes where the crack ends. After you have straightened the frame, weld the crack together.

Before you start to straighten the frame, first think carefully the best way for doing this. Special jacks are available for straightening and these are fixed to the frame by means of hooks and chains.

If any part of the frame is to be cut off, the cutting must be done 10–15 mm (3/8–9/16") from the material that has to remain. The rest of the material to be removed must be removed by filing and sandpapering.

Any welding work on a frame requires great experience and must be carried out with great care. No cracks must be allowed to remain. Inspect the weld joints thoroughly after they have cooled.

GROUP 72 SPRINGS

Description

2-axle vehicle

Both the front and rear springs are of the conventional leaf type. The front end of the springs is rigidly suspended in spring bolts. The rear ends hang from spring shackles. The vehicle is provided with hollow-rubber springs, both front and rear.

3-axle vehicle

The design and suspension of the front springs is the same as for 2-axle vehicles. But the rear springs are of the parabel type. Rear springing is progressive with slip suspension at both ends, see Fig. 76–2. The vehicle has hollow-rubber springs front and rear.

Service Procedures

SPRINGS

2-axle vehicle and 3-axle vehicle (front)

Removing a spring

1. Jack up the vehicle.
2. Unbolt the wheel covering the spring.
3. Remove the front spring bolt.
4. Remove the four bolts for the rear spring anchorage so that the entire spring shackle is also removed at the same time.
5. Unscrew the nuts on the U-bolts and lift out the spring.

Installing a spring

1. Place the spring in position.
2. Bolt on the front spring bolt, but only a couple of threads. IMPORTANT! Make sure that the spring bolt in the rear spring takes the right thread in order no to damage the threads on the weld nut.
3. Fit the spring plate with the U-bolts. If you have any difficulty in centring the centre bolt on the rear spring, release the reaction rod. Tighten the nuts on the U-bolts.
4. Bolt tight the rear spring anchorage.
5. Make sure that all released spring bolts are not tightened up. Jack up the vehicle under the axle. Load the vehicle until there is an angle of 90° between the spring shackle and frame. Then tighten the spring shackle upper bolt. Load the vehicle further until the spring is flat and tighten up the remaining spring bolts.
6. Mount the wheel, tighten up the wheel studs and lower the vehicle.

Testing a spring

A spring can be tested in a hydraulic press. The press, however, must be provided with a sufficiently accurate pressure gauge and it must have such a device that the spring cannot slide out sideways.

Invert the spring and place it in the press. Place supports at both ends. Apply pressure to the centre bolt, see Fig. 72–1. Check the spring test value against the data. If the pressure gauge indicates that the spring is faulty, straighten it or replace it.

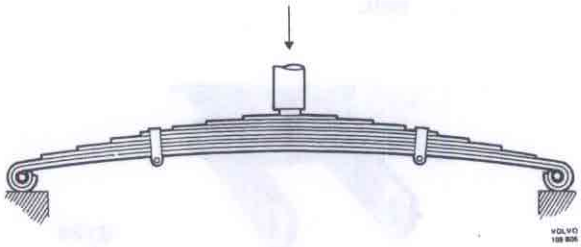


Fig. 72–1. Testing a spring

Fractured spring leaves

When one or several of the spring leaves are fractured, not only must they be replaced but the reason for the fracture should be looked into.

If the fracture is towards the middle of the spring, then the reason may be a faulty shock absorber. A fracture may also be due to a broken centre bolt or overloading.

Replacing spring bushings

Special tools:

6124 Press tool
6125 Drift
6138 Guide

Front springs

1. Jack up the vehicle.
2. Unbolt and remove the wheel covering the spring.

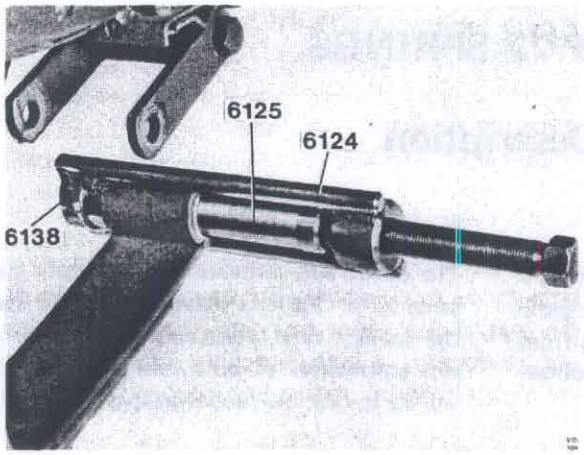


Fig. 72–2. Pressing out a spring bushing

3. Unscrew the spring bolt for the bushing to be replaced.
4. Fit press tool 6124, drift 6125 and guide 6138 according to Fig. 72–2 and press out the bushing.
5. Press in the new bushing using only press tool 6124, see Fig. 72–3, and screw in the spring bolt.

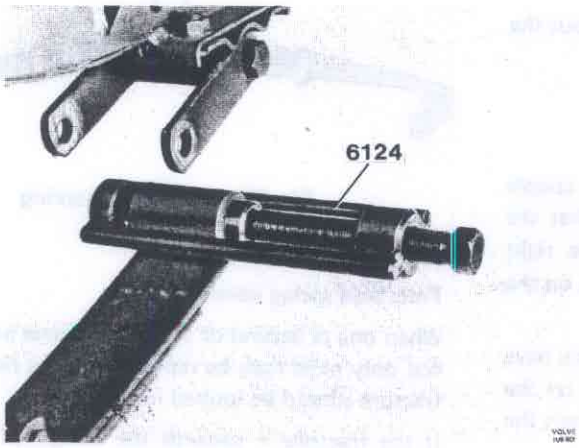


Fig. 72–3. Pressing in a spring bushing

6. Make sure that all spring bolts that were loosened are not tightened up. Jack up the vehicle under the axle. Load the vehicle to an angle of 90° between the spring shackle and frame. Then tighten up the spring shackle upper bolt. Load the vehicle further until the spring is straight and tighten up the remaining spring bolts.
7. Replace the upper bushing in the rear anchorage in the press with the drift 6125, see Fig. 72–4.
8. Mount and screw tight the wheel. Lower the vehicle.

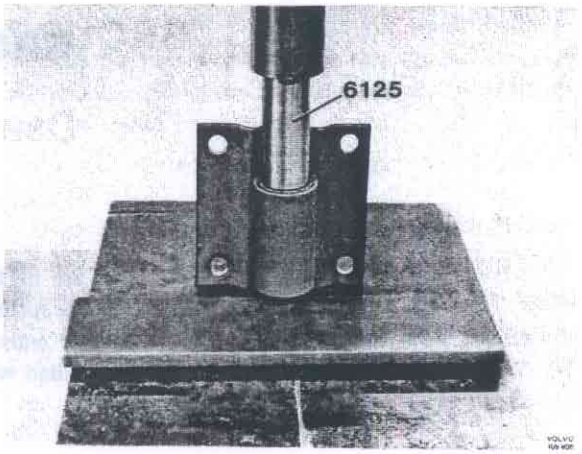


Fig. 72–4. Pressing bushing out of anchorage

Rear springs

1. Screw down the rear spring according to the instructions given under the heading "Removing a spring".
2. Press out the bushings in the spring with press tool 6124 and drift 6125, see Fig. 72–2.
3. Press in the bushings with only press tool 6124, see Fig. 72–3.
4. Replace the upper bushing in the rear anchorage in the press with drift 6125, see Fig. 72–4.
5. Bolt tight the spring according to the instructions given under the heading "Installing a spring".

3-axle vehicle, rear springs

Removing a rear spring

1. Jack up the vehicle and unbolt and remove the wheels.
2. Release the U-bolts and the lock bolts (4, Fig. 76–2). Lift out the spring.

Installing a rear spring

1. Place the spring and fit the U-bolts. Do not tighten up the U-bolts.
2. Torque the lock bolts to 230–280 Nm (23–28 kpm = 166–202 lbftf), and tighten up the lock nuts.
3. Torque the U-bolts to 230–280 Nm (23–28 kpm = 166–202 lbftf).
4. Mount the wheels, screw tight the wheel studs and lower the vehicle.

Testing a spring-fractured spring leaf

See under the heading "2-axle vehicle and 3-axle vehicle (front)".